Indian School Al Wadi Al Kabir
Assessment – I (2025-2026)

Class: XII | Subject: Physics (042) | Max. marks: 70
Date: 16/09/2025 | Set- II -MS | Time: 3 Hours

[1][a] no net charge is enclosed by the surface

[2][d] 4:1

[3][c] repulsive and $\frac{q\lambda}{2\pi X\varepsilon_0}$

[4][c] $-qLE$

[5][d]Zero

[6][b] E = 0 N/C , V = 30V

[7][a]

[8](C] 2H
[9][c] 16/3 ohm
[10] [c]be double of its initial value
[11][c] π:4

[12] [d] diamagnetic

[13]A

[14]A

[15]A

[16]A

[17] Capacitance -figure [1/2] Steps[1] Final result –[1/2]

OR

[17] potential energy -figure [1/2]

Steps[1]

Final result –[1/2]

[18]der. resistivity figure [1/2]

Steps[1] Final result –[1/2]

[19]Torque figure [1/2] Steps[1] , Final result –[1/2]

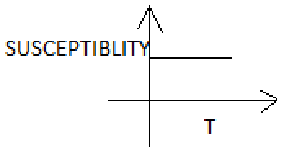
OR

[19] Moving coil galvanometer -fig [1/2],

deri [1] , final result [1/2]

[20][i] [a] a is diamagnetic,   b is par[b]   [1]

[ii]



[1]

[21]

(i) $\phi_2 = MI_1$ ½

Slope of the graph , M = $\frac{\phi_2}{I_1}$

M = 2.5 H ½

(ii) $|\in_2| = M\frac{dI_1}{dt}$ ½

$\frac{dI_1}{dt} = \frac{|\in_2|}{M} = \frac{100}{2.5} = 40\ As^{-1}$ ½

SECTION C

[22]

22 Charge on sphere S_1 :

Q_1 = surface charge density × surface Area **1/2**

$= \left(\frac{2}{\pi}\times10^{-9}\right)\times4\pi(1\times10^{-2})^2$

$= 8\times10^{-13}\,C$ **1/2 +1/2**

Charge on sphere S_2 :

Q_2 = surface charge density × surface Area

$= \left(\frac{2}{\pi}\times10^{-9}\right)\times4\pi(3\times10^{-2})^2$

$= 72\times10^{-13}\,C$ **1/2**

When connected by a thin wire they acquire a common potential V and the charge remains conserved.

$Q_1 + Q_2 = Q_1' + Q_2'$

$\frac{Q_2'}{Q_1'} = \frac{r_2}{r_1}$ **1/2**

On solving, $Q_1' = 2\times10^{-12}\,C$ **1/2**

[23]Definition - drift velocity [1]

Fig. [1/2]

Steps[1]

Final ans -[1/2]

[24]

b)

$$R = \frac{V}{i_g} - G$$

$$R_1 = \frac{2V}{i_g} - G = R_o - G$$

$$R_1 + G = 2R_o$$

$$\left[Where\ R_o = \frac{V}{i_g}\right]$$

Similarily

$$R_2 + G = R_o$$

$$R_3 + G = R_o/2$$

From the above equations,

$$R_1 - R_2 = 2(R_2 - R_3$$

$$R_1 - 3R_2 + 2R_3 = 0$$

[1+1+1]

[25] Bp = $\frac{\mu_0 Ia^2}{2[r^2+x^2]^{3/2}} = \frac{\mu_0 Ia^2}{2[r^2+r^2]^{3/2}} = \frac{\mu_0 Ir^2}{4\sqrt{2}r}$towards P [1]

Bq = $\frac{\mu_0\, 2Ir^2}{4\sqrt{2}r}$ towards Q [1]

Net B = Bq – Bp = $\frac{\mu_0 I}{4\sqrt{2}r}$ [1/2 + 1/2]

[26] Cof self induction def:[1]

Fig[1/2],Steps

[1]Final ans [1/2]

OR

[26] Basic principle -EMI [1/2]

Diagram of ac generator–[1],

Construction [1],Working[1/2]

[27]

a)

$$X_L = \omega L = 2\pi\nu L \quad [1/2$$

$$\therefore X_L = 2\pi \times 50 \times \frac{5}{\pi} = 500\,\Omega \quad [1/2]$$

$$I_{rms} = \frac{200}{500} = \frac{2}{5} = 0.4A \quad [1/2]$$

$$I_0 = \sqrt{2}\, I_{rms}$$

$$= \sqrt{2} \times 0.4$$
$$= 0.56\,A \quad [1/2]$$

[Even if student expresses the answer as $(0.4\sqrt{2})A$ give the last ½ marks]

b) $\frac{\pi}{2}$ or 90^0 [1/2]

decreases

1/2]

[28] ωo = $\frac{1}{\sqrt{LC}}$ or ωo = 50 rad/s [1/2]

Irms = $\frac{Erms}{Z}$ = $\frac{200}{40}$ = 5A [1/2]

Current amplitude Io = Irms x √2 = 7.07A –[1]

(iii) Power dissipated in circuit

P=Erms Irms cosϕ = 200x5x1= 1000W [1/2 + ½]

[29] [1] Ans.[d] electric field, E = 0, Potential V = constant

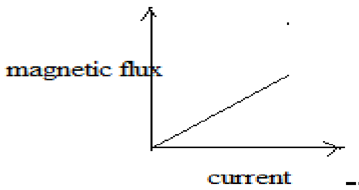
[2] Ans.[b] $\frac{-q}{4\pi r_1^2}$

[3] Ans. [c] $\frac{Q+q}{4\pi r_2^2}$

[4] Ans.[b]+q

[30][1] south pole [1]

[2]



---[1]

[3] Lenz's law [1]

Magnet and coil experiment .Mention about the repulsion during the forward motion of the magnet towards the coil [1]

SECTION E

[31] [1] [a]derivation force between parallel conductors

Fig. [1/2] Steps [1+1/2] Final result [1/2]

Def 1A -- [1]

[b] $F = q\,[v \times B] = q\,[\,3 \times 10^5\,\hat{\imath} \times 0.4\,\hat{\imath} + 0.3\,\hat{\jmath}\,]$ [1]

$F = 4.8 \times 10^7 a$

$a = 4.32 \times 10^{12}\,\widehat{K}\,\frac{m}{s^2}$ [1/2]

OR

[31][II] [a]Magnetic field due a coil at a distance

Fig. [1]

Steps [1+1]

Final result [1/2]

[b]

$I = e/T = e\,\omega/2\pi$

$B = \mu_o I/2r = \mu_o e\omega/4\pi r$ [1/2 +1/2 +1/2]

[32][I][i] def -mutual induction -[1]

[ii]Der of mutual inductance

Fig. [1/2]

Steps [1+1/2] Final result [1/2]

[iii] $M = e_2/\,di_2/dt$ [1/2]

$=(50 \times 10^{-3}) / (8/0.5)$ [1/2]

$=3.125 \times 10^{-3}$ H [1/2]

OR

[32] [II][i] der. emf in rotatory motion

Fig. [1/2] Steps [1+1+1/2] Final result [1/2]

[ii]

(iii) (c) : Here, $l = 0.1$ m, $v = 1$ m s^{-1}

$I = 50$ A, $B = 1.25$ mT $= 1.25 \times 10^{-3}$ T

The induced emf is, $\varepsilon = Blv$

The mechanical power is

$P = \varepsilon I = BlvI = 1.25 \times 10^{-3} \times 0.1 \times 1 \times 50$

$= 6.25 \times 10^{-3}$ W $= 6.25$ mW

[1/2 + ½ +1/2]

[33][I][i] dia gram -step up [1]

Principle ---[1/2]

Derivation of K STEPS – [1+1/2], Final result –[1/2]

[ii]

Solution. (a) Transformation ratio K $= \frac{Ns}{Np}$ or Ns = K Np = 100 X 100 = 10,000 [1/2]

(b) Input voltage Vp = 220 V, Input power Pin = 1100 W [1/2]

Current in primary coil Ip = $\frac{Pin}{Vp}$ = 1100/220 = 5 A [1/2]

OR

[33][II] [i]LCR

Circuit, [1/2],

Phasor diagram [1/2] , Steps [1],

Peak value of current [½]

Phase relation [1/2] , Z = ? [1/2]

[ii]

Reactance of the inductor (*X*L) is given by,

XC=ωL=2πfL
⇒XC=500Ω [1/2]

(a) Impedance of an LCR circuit (Z) is given by,

Z=R2+(XC−XL)2
⇒Z=(300)2+(500−100)2
⇒Z=(300)2+(400)2
⇒Z=500 [1/2]

RMS value of current Irms is given

Irms=Zεrms
⇒Irms=50050
⇒Irms=0.1A [1/2]